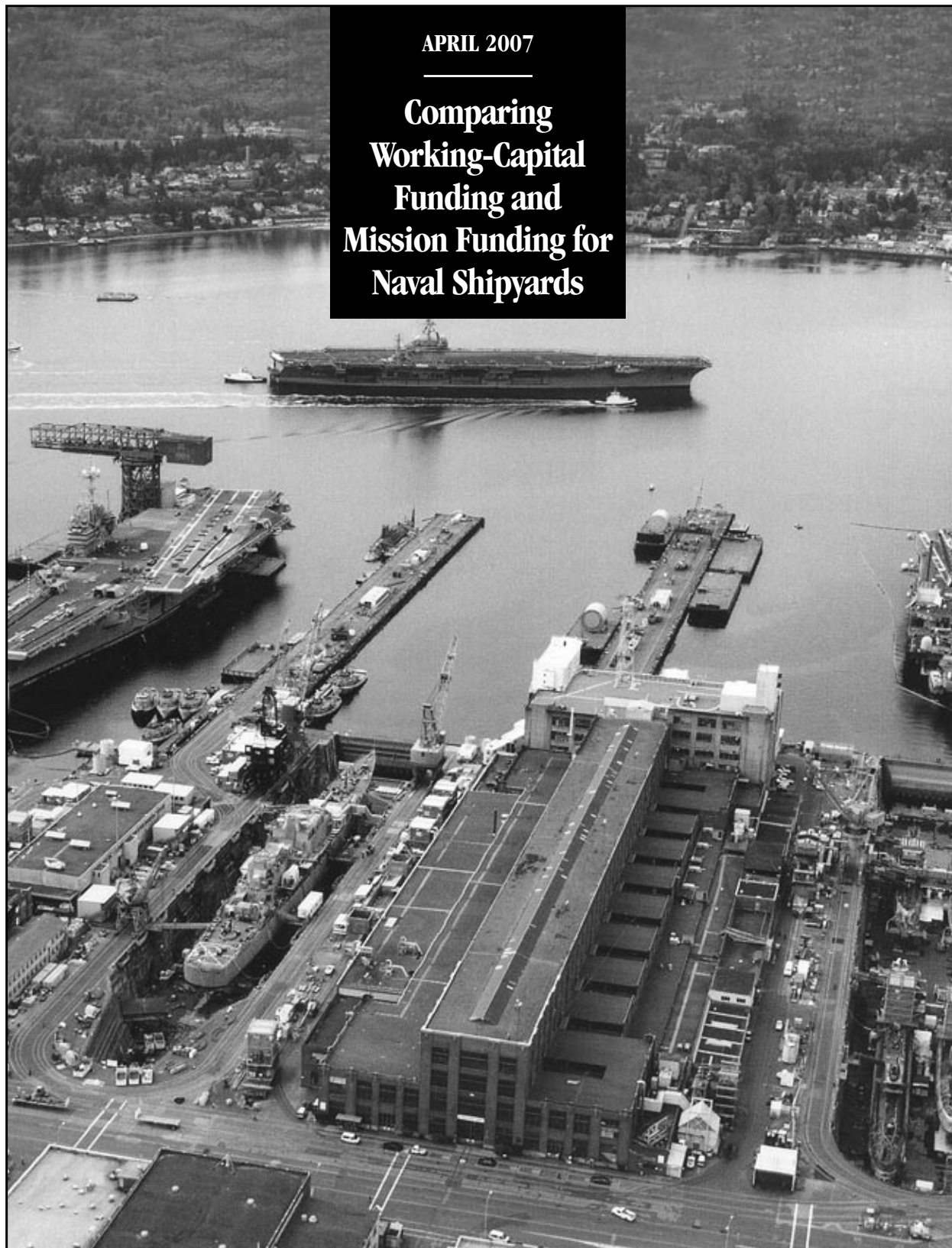


CONGRESS OF THE UNITED STATES  
CONGRESSIONAL BUDGET OFFICE

A  
**CBO**  
PAPER

APRIL 2007

**Comparing  
Working-Capital  
Funding and  
Mission Funding for  
Naval Shipyards**



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# **Comparing Working-Capital Funding and Mission Funding for Naval Shipyards**

April 2007

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## Notes

Unless otherwise indicated, all years referred to in this report are federal fiscal years.

Cover photo of Puget Sound Naval Shipyard, in Bremerton, Washington, courtesy of the Department of the Navy.

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## Preface

**T**he Navy owns and manages four shipyards that maintain, repair, overhaul, and upgrade surface ships and submarines—a range of services that costs the Navy over \$3 billion annually. In recent years, the Navy has changed the funding mechanism for each of the shipyards, shifting them from the Navy Working Capital Fund to direct appropriations. That change could have a substantial effect on the shipyards' operations and on the tracking of their costs and performance.

This Congressional Budget Office (CBO) paper—which was prepared at the request of the Readiness Subcommittee of the House Committee on Armed Services—outlines the advantages and disadvantages of working-capital funding versus mission funding for financing naval shipyards' operations. In keeping with CBO's mandate to provide objective, impartial analysis, the report makes no recommendations.

This paper was prepared by Daniel Frisk and R. Derek Trunkey under the supervision of J. Michael Gilmore and Matthew Goldberg. Research assistance was provided by Victoria Liu. The Department of the Navy commented on an interim version of this report, as did W. Brent Boning and Glenn Ackerman of the Center for Naval Analyses and Edward Keating and Chris Hanks of the RAND Corporation. Arlene Holen, Joseph Kile, Donald Marron, David Moore, and Michael Simpson of CBO and Henry L. Eskew, a private consultant, reviewed the current paper. (The assistance of external reviewers implies no responsibility for the final product, which rests solely with CBO.)

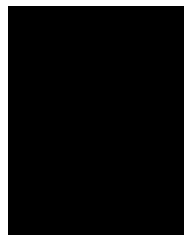
Leah Mazade edited the report, and Kate Kelly proofread it. Maureen Costantino designed the cover and prepared the report for publication. Lenny Skutnik printed the initial copies, Linda Schimmel coordinated the print distribution, and Simone Thomas prepared the electronic version for CBO's Web site ([www.cbo.gov](http://www.cbo.gov)).



Peter R. Orszag  
Director

April 2007





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# Comparing Working-Capital Funding and Mission Funding for Naval Shipyards

## Introduction and Summary

The Navy owns and operates four shipyards: the Norfolk Naval Shipyard in Portsmouth, Virginia; the Portsmouth Naval Shipyard in Kittery, Maine; the Puget Sound Naval Shipyard in Bremerton, Washington; and the Pearl Harbor Naval Shipyard in Pearl Harbor, Hawaii. In recent years, the Navy has changed the mechanism it uses to fund each of the shipyards, shifting from the Navy Working Capital Fund (NWCF) to direct appropriations.<sup>1</sup> Previously, under the NWCF's revolving-fund approach, the shipyards set prices for maintenance and repair services that were intended to cover their full operating costs, and the Navy's Atlantic and Pacific Fleets as well as its other customers paid for those services out of their appropriated funds. Now, under the direct appropriations approach, the Navy uses a portion of the money appropriated to it by the Congress to fund the shipyards directly, a financing mechanism known as mission funding.

The Navy believes that the shift to mission funding gives it more flexibility in allocating its resources across regions and types of maintenance.<sup>2</sup> But the change has generated some concern, both within the Department of Defense (DoD) and the Congress and among outside observers

and organizations. Naval shipyards had been operating successfully under some form of revolving-fund financial system since the 1950s;<sup>3</sup> as a result, some analysts have questioned the Navy's rationale for the change. Critics of shifting to direct appropriations believe that mission funding makes costs and operations less transparent, eliminates beneficial businesslike incentives that working-capital funds create, and potentially reduces shipyards' ability to obtain capital to replace equipment and make improvements. The Navy, however, maintains that mission funding of shipyards "provides the best mechanism by which the Navy can match workforce skills with workload priorities and still meet fiduciary responsibilities."<sup>4</sup>

The Congressional Budget Office (CBO), at the request of the Readiness Subcommittee of the House Committee on Armed Services, has studied the advantages and disadvantages of working-capital and mission funding as they apply to naval shipyards. This is the third CBO report that addresses shipyard funding; it incorporates information and data that CBO has collected since it published *Comparing Working-Capital Funding and Mission Funding for Naval Shipyards: An Interim Report* in December 2005. CBO's *Review of Proposed Congressional Budget Exhibits for the Navy's Mission-Funded Shipyards*, published in April 2006, had a narrower scope than either the 2005 or the present report.

This paper provides an overview of naval ship maintenance and describes the shipyards' transition from working-capital to mission funding. It also compares the

- 
1. Pearl Harbor shifted from working-capital funding to mission funding on October 1, 1998, and Puget Sound changed funding mechanisms on October 1, 2003. The Congress addressed the change of funding mechanisms for the two East Coast shipyards, Portsmouth and Norfolk, in section 322 of the National Defense Authorization Act for Fiscal Year 2006 (Public Law 109-163, 119 Stat. 3191). Portsmouth and Norfolk switched funding mechanisms on October 1, 2006, the earliest transition date that the Congress allowed.
  2. Department of the Navy, *Fiscal Year (FY) 2007 Budget Estimates Submission: Justification of Estimates—Navy Working Capital Fund* (February 2006).

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3. General Accounting Office (now the Government Accountability Office), *Navy Industrial Fund: U.S. Naval Shipyards*, Bureau of Ships: Department of the Navy (December 1955), p. 1.
  4. Department of the Navy, Office of Budget, *Highlights of the Department of the Navy FY2007 Budget* (February 2006), p. 4-12.

structure, operation, reporting requirements, performance, and incentives of the two funding mechanisms.

CBO's analysis indicates that working-capital funding and mission funding have both strengths and weaknesses as shipyard financing approaches. To the extent that the available data permitted comparisons, CBO found no aspect of either financing mechanism that strongly supported or challenged the Navy's decision to shift all of its shipyards to mission funding. CBO's findings include the following:

- The working-capital funding system required shipyards to track and report their costs in order to determine operating results (profits or losses) and future billing rates. Mission funding has reduced the amount of cost data available to Navy headquarters personnel and the Congress, in part because appropriate reports of shipyards' costs have not been requested or developed—and not because such costs cannot be tracked at a comparable level of detail for mission-funded activities. The Navy is working with the Congress to increase the information in its budget, cost, and performance reporting for shipyards.
- Mission funding may increase the flexibility that the Navy has to manage the workforce and workload of its shipyards, although the service has offered only anecdotal evidence of that benefit. Mission funding allows the Navy to shift workers among maintenance projects and facilities; moreover, such financing lessens the possibility that unexpected changes in schedules—because of unforeseen events—will idle shipyards' workers. (Although the shifting of workers was possible under the working-capital mechanism, the required paperwork and transfers of funds could, in some cases, cause delays in projects or activities.) In the absence of major changes in schedules, the flexibility afforded by mission funding affects relatively small numbers of workers at any given time because shipyards, regardless of how they are funded, primarily use overtime to match their workforces with changing workloads.
- The available data indicate no relationship—as measured by a number of metrics—between a shipyard's funding system and its operational performance.
- The available data indicate no relationship between a shipyard's funding system and its capital expenditures.
- Because of differences in the costs borne by the users of shipyards under each system, working-capital funding may lead to underutilization of shipyards' capacity, whereas mission funding may lead to overutilization.

## The Maintenance of Navy Ships

Ship maintenance is categorized by level and type and is performed at both public and private facilities. The shift in funding that is the focus of this paper occurred at the public naval shipyards that perform depot-level maintenance (the most intensive level). The shift was a component of the Navy's integration of intermediate- and depot-level facilities and maintenance.

### Levels of Maintenance and Maintenance Facilities

The Navy classifies ship maintenance activities as organizational, intermediate, or depot level.<sup>5</sup> Organizational-level maintenance, the most basic, is typically performed as needed by a ship's crew without external assistance and involves such routine tasks as replacing minor parts, performing preventive maintenance inspections, and lubricating machinery.

By comparison, intermediate-level maintenance requires more skilled or more extensive work on ships' systems and equipment. Navy and civilian personnel generally perform intermediate-level maintenance at designated facilities (including on tender ships); the Navy operates a number of such facilities, mostly in the United States (see Table 1). The service's intermediate facilities are mission funded; each is owned and operated by the Atlantic or the Pacific Fleet, and each tends to specialize in certain classes of ships. Intermediate maintenance on a ship is typically carried out during what the Navy calls a "fleet maintenance availability" (that is, when a ship is available for maintenance). The Navy requires such maintenance once per quarter for submarines and once every six months for surface ships; the fleet commanders coordinate intermediate-level maintenance with ships' operational schedules.<sup>6</sup>

Depot-level maintenance involves the most comprehensive and time-consuming maintenance work, including ship overhauls, alterations, refits, restorations, and

5. Department of the Navy, Office of the Chief of Naval Operations, *OPNAV Instruction 4700.7K* (July 2003).

6. *Ibid.*, Enclosure 2, p. 4.

nuclear refuelings.<sup>7</sup> To perform that work, the Chief of Naval Operations schedules depot-level availabilities and establishes guidance for the intervals between them.<sup>8</sup>

Depot-level maintenance is generally performed by civilians at naval or private shipyards. In addition, shipyards may send their employees offsite (for example, to a ship in its home port or to an intermediate-level facility) to perform maintenance and repairs when depot-level expertise or additional manpower is needed.

When shipyards were financed under the Navy Working Capital Fund, the facilities were owned and operated by the Naval Sea Systems Command (NAVSEA), which managed their budgets and set their operating procedures. Now, under mission funding, the Atlantic and Pacific Fleets manage the budgets of shipyards, although NAVSEA continues to manage their technical and operational procedures.

In 2005, the Navy's four shipyards performed a total of 4.0 million labor-days of direct work at a cost of about \$3.1 billion, according to CBO's estimates—or close to \$800 per fully burdened (including all overhead) direct labor-day.<sup>9</sup> In addition, private shipyards perform some depot-level maintenance; about \$1.7 billion of the Navy's depot maintenance funds went to private shipyards in 2005.<sup>10</sup> The private-sector shipbuilding and ship repair industry in the United States is dominated by the so-called Big Six shipyards, each of which is owned by one of two parent companies.<sup>11</sup>

### Naval Shipyards' Workload

Most of the work of naval shipyards is performed for the Department of the Navy and focuses on nuclear-powered ships and submarines.<sup>12</sup> A very small share of shipyards' work (typically 1 percent to 4 percent, in dollar terms) is

conducted for other DoD customers, other federal agencies, commercial customers, and foreign governments.

The major customers for each shipyard are the corresponding fleet and NAVSEA. The Puget Sound and Pearl Harbor shipyards work primarily on ships that belong to the Navy's Pacific Fleet; the Norfolk and Portsmouth shipyards work mainly on Atlantic Fleet ships. (The two pairs of shipyards do similar types of work because the composition, structure, and missions of the Atlantic and Pacific Fleets are similar.) Generally, the fleets control the Navy's ship operation and maintenance (O&M) funds, and NAVSEA controls the service's ship construction and conversion (SCN) funds. O&M funds typically pay for routine, preventive, and corrective maintenance, and SCN funds usually pay for alterations (such as conversion of ballistic missile submarines to cruise missile submarines), upgrades, and refueling of nuclear ships. (SCN funds also pay for construction of new ships.) The fleets fund their depot-level maintenance work through direct appropriations from the Congress to the shipyards. NAVSEA-funded work is usually performed on a reimbursable basis: The shipyard that performs the work bills NAVSEA for direct costs (materials and labor); the associated indirect costs are paid out of the shipyards' or other offices' appropriated budgets.

Depot-level maintenance availabilities are scheduled years in advance; for most submarines and aircraft carriers, availabilities are plotted out for the life of the ship.<sup>13</sup> On the basis of those schedules, the Navy constructs an approximate work plan for depot-level maintenance that extends 25 to 35 years into the future.<sup>14</sup> The Navy prepares a final schedule about 3 to 5 years in advance. To determine which shipyard should be assigned a specific

7. Department of the Navy, *Fiscal Year (FY) 2006/FY 2007 Budget Estimates: Justification of Estimates—Navy Working Capital Fund* (February 2005).

8. For maintenance intervals, see Department of the Navy, Office of the Chief of Naval Operations, *OPNAV Notice 4700* (June 2005).

9. Direct work comprises tasks that are identified as components of a maintenance project. Indirect work, which is billed as overhead, involves administrative and support tasks.

10. Based on data provided to CBO by the Navy on November 18, 2005. The \$1.7 billion figure excludes public/private partnerships and refuelings of nuclear carriers.

11. General Dynamics owns Bath Iron Works (located in Bath, Maine), Electric Boat (Groton, Connecticut), and National Steel and Shipbuilding Company (San Diego, California). Northrop Grumman owns Newport News Shipyard (Newport News, Virginia), Ingalls Shipyard (Pascagoula, Mississippi), and Avondale Shipyard (New Orleans and Tallulah, Louisiana, and Gulfport, Mississippi). Newport News Shipyard is the sole U.S. facility capable of designing, building, and refueling nuclear-powered aircraft carriers.

12. Only six U.S. shipyards are licensed to perform nuclear work: the four naval shipyards, Newport News, and Electric Boat.

13. Department of the Navy, Office of the Chief of Naval Operations, *OPNAV Notice 4700*.

14. CBO staff discussion with Navy personnel, December 14, 2005.

**Table 1.****The Navy's Depot- and Intermediate-Level Maintenance Facilities**

Facility	Location	Types of Ships Maintained	Personnel	
			Civilian <sup>a</sup>	Military
Depot-Level Maintenance				
Portsmouth Naval Shipyard	Kittery, Maine	Nuclear attack submarines	3,958	30
Norfolk Naval Shipyard	Portsmouth, Va.	Any type of Navy ship	7,679	43
Puget Sound Naval Shipyard <sup>b</sup>	Bremerton, Wash.	Any type of Navy ship	8,879	748
Pearl Harbor Naval Shipyard <sup>c</sup>	Pearl Harbor, Hawaii	Nuclear submarines and nonnuclear surface ships <sup>d</sup>	3,839	646
Ship Repair Facility				
Ship Repair Facility <sup>e</sup>	Yokosuka, Japan	Nonnuclear surface ships	2,155	112
Intermediate-Level Maintenance				
Naval Ship Support Facility	New London, Conn.	Nuclear attack submarines	280	449
Mid-Atlantic Regional Maintenance Center	Norfolk, Va.	Any type of Navy ship (Detachments in Bahrain and Naples, Italy)	1,007	1,563
Southeast Regional Maintenance Facility <sup>f</sup>	Mayport, Fla.	Surface ships and nonnuclear aircraft carriers	103	739
Trident Refit Facility	King’s Bay, Ga.	Ballistic missile submarines	1,064	392
South Central Regional Maintenance Facility <sup>g</sup>	Ingleside, Tex.	Minesweepers	39	280

**Continued**

availability, the Navy considers the complexity and type of work required, dry-dock space (each shipyard has a handful of dry-docks), and the assignment's implications for the goal of ensuring ship maintenance capabilities in the public and private sectors.<sup>15</sup> Advance scheduling is necessary because a single availability requires months of planning and a substantial amount of labor and directly affects the operations of the naval fleets.

Yet despite the Navy's advance planning, near-term changes in its schedule for depot-level maintenance do occur. Unscheduled availabilities—for example, when a ship sustains damage in battle or runs aground—may arise. In such instances, the Navy may reallocate resources and shift the schedule accordingly. (How shipyards

respond to changes in availability schedules is discussed later.)

The Navy's plans for shipbuilding and maintenance suggest that the demand for maintenance could decline in the future.<sup>16</sup> From 2001 to 2005, midlife refueling of nuclear-powered submarines made up a significant portion of the workload of naval shipyards—by CBO's estimate, an average of nearly 20 percent of the four shipyards' total workload. But the next generation of submarines, the Virginia-class (the successor to the Los Angeles-class) and the as-yet-unnamed successor to the

15. Department of the Navy, Office of the Chief of Naval Operations, *OPNAV Instruction 4700.7K*, p. 12.

16. For more information on the future of the naval fleets, see Congressional Budget Office, *Resource Implications of the Navy's Fiscal Year 2008 Shipbuilding Plan* (March 23, 2007), *Long-Term Implications of Current Defense Plans: Summary Update for Fiscal Year 2007* (October 2006), and *Options for the Navy's Future Fleet* (May 2006).

**Table 1.****Continued**

Facility	Location	Types of Ships Maintained	Personnel	
			Civilian <sup>a</sup>	Military
Intermediate-Level Maintenance (Continued)				
Southwest Regional Maintenance Facility	San Diego, Calif.	Any type of Navy ship	609	1,388
Everett Intermediate Maintenance Facility <sup>b</sup>	Everett, Wash.	Aircraft carriers and surface ships	Included above in depot-level total	Included above in depot-level total
Intermediate Maintenance Facility <sup>b</sup>	Bangor, Wash.	Ballistic missile submarines	Included above in depot-level total	Included above in depot-level total
Pearl Harbor Intermediate Maintenance Facility <sup>c</sup>	Pearl Harbor, Hawaii	Nuclear submarines and nonnuclear surface ships	Included above in depot-level total	Included above in depot-level total

Source: Congressional Budget Office based on information from the Department of the Navy.

Note: These facilities exclude tender ships.

- a. Includes contractors.
- b. Merged with the Puget Sound Shipyard to become the Puget Sound Naval Shipyard and Intermediate Maintenance Facility. Personnel for the intermediate facility are included in the shipyard personnel totals.
- c. Merged with the Pearl Harbor Shipyard to become the Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility. Personnel for the intermediate facility are included in the shipyard personnel totals.
- d. Pearl Harbor is also capable of performing emergency depot work on nuclear aircraft carriers.
- e. This facility, the only remaining ship repair facility (SRF), can perform depot-level work on nonnuclear surface ships. The Japanese government currently provides some of the SRF's workforce at a negotiated reduced rate.
- f. The Southeastern Regional Maintenance Facility had a detachment in Pascagoula, Mississippi, that was closed as a result of the 2005 BRAC (base realignment and closure) round.
- g. This facility will be relocated to the Southwest Regional Maintenance Facility in San Diego, California, as a result of the 2005 BRAC round.

Ohio-class, will not require refueling. Instead, the Navy plans to retire those submarines when their reactors' fuel is spent (see Figure 1). The Navy has "inducted" its last Los Angeles-class attack submarine for refueling; the last refueling of an Ohio-class submarine is scheduled for 2018. As the amount of that kind of work declines, the Navy will have to find new work for its shipyards or reduce its depot-level maintenance capacity.<sup>17</sup>

### The Shift to Mission Funding as Part of the Navy's Regional Maintenance Plan

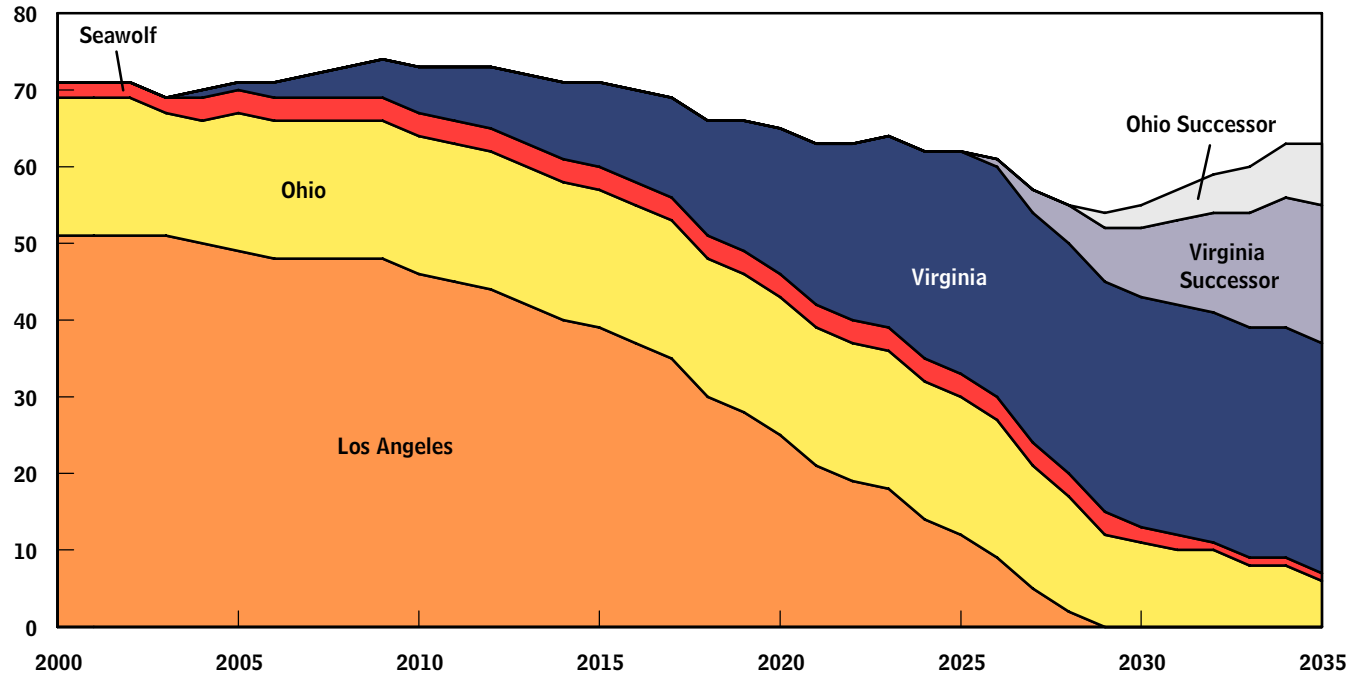
The implementation of the Navy's Regional Maintenance Plan prompted the service to change the funding mecha-

nism for its shipyards from the Navy Working Capital Fund to direct appropriations. According to the Navy, that ongoing plan has three phases: consolidating intermediate-level activities to increase efficiency, integrating intermediate- and depot-level activities, and conducting fleet maintenance by using a single, standardized

17. In part because of excess shipyard capacity, the Navy recommended that the Portsmouth shipyard be closed as part of the 2005 BRAC (base realignment and closure) round. However, the BRAC Commission recommended that Portsmouth remain open, and the Congress allowed its recommendations to pass into law.

**Figure 1.****The Navy's Planned Submarine Fleet**

(Number of submarines)



Source: Congressional Budget Office based on data from the Department of the Navy.

maintenance process.<sup>18</sup> In reorganizing maintenance facilities under its regional plan, the Navy aims to eliminate duplication and overlapping of maintenance resources by placing the depot- and intermediate-level maintenance facilities in a region under one command.<sup>19</sup>

To test its concept of regional maintenance, the Navy in 1997 selected the Pearl Harbor Naval Shipyard and the Pearl Harbor Intermediate Maintenance Facility for an integration pilot program. At the time, the Pearl Harbor shipyard was financed through the working-capital mechanism and the intermediate facility by mission funding. The Navy concluded that fully integrating the facilities required a common funding system, and it selected mission funding over working-capital funding for several reasons, including the fact that the mission-funded Pacific

Fleet was (and continues to be) Pearl Harbor's largest customer and the Navy expected fewer financial hurdles in integrating the consolidated maintenance facility with the fleet's existing funding structure.<sup>20</sup> The Navy initiated a similar pilot project in 2003 to integrate Puget Sound Naval Shipyard with intermediate-level facilities on the West Coast.

According to the Navy, the transition to a common funding mechanism facilitated consolidation of intermediate- and depot-level facilities at Pearl Harbor and Puget Sound and improved the flexibility and responsiveness of the shipyards' workforces.<sup>21</sup> Some observers, however, have questioned whether the Navy's experience with Pearl Harbor and Puget Sound is applicable to the Portsmouth and Norfolk shipyards because of differences in the type

18. For more details, see Department of the Navy, *Report to Congress: Pearl Harbor Regional Maintenance Pilot* (May 2001); and General Accounting Office, *Depot Maintenance: Status of the Navy's Pearl Harbor Pilot Project*, GAO/NSIAD-99-199 (September 1999).

19. Department of the Navy, *Report to Congress: Pearl Harbor Regional Maintenance Pilot*, p. 1.

20. General Accounting Office, *Depot Maintenance: Key Financial Issues for Consolidations at Pearl Harbor and Elsewhere Are Still Unresolved*, GAO-01-19 (January 2001), p. 25.

21. Statement of Vice Admiral Justin D. McCarthy, U.S. Navy, before the Readiness Subcommittee of the House Armed Services Committee, April 4, 2006.

of intermediate-level maintenance facility that would be integrated and the extent and nature of the integration. The intermediate facilities near the Norfolk and Pearl Harbor shipyards work on submarines and surface ships (including carriers, in the case of Norfolk). At Puget Sound, the nearest intermediate facility works exclusively on submarines (primarily Ohio-class ballistic missile submarines). Furthermore, the Navy has no plans to integrate the Portsmouth shipyard with any intermediate maintenance facility (including the East Coast's Trident submarine facility in Kings Bay, Georgia), nor is that shipyard located near the home ports of any ships. (Home-ported ships may request impromptu support from nearby shipyards.)

## Comparing Working-Capital Funding and Mission Funding

The Navy believes that mission funding is more effective than working-capital funding for financing the operations of shipyards. Specifically, the service maintains that mission funding provides operational flexibility and allows a fleet to align the shipyards' work priorities with its own requirements. However, observers outside the Navy have argued that the move to mission funding eliminates some of the advantages of working-capital funding, such as the visibility of total costs. The Office of the Secretary of Defense (OSD), DoD's Inspector General, and the Government Accountability Office (GAO) have expressed concern that the Navy has not documented the performance of the Pearl Harbor and Puget Sound pilot programs well enough and has not developed appropriate metrics to objectively compare the shipyards' performance before and after the transition to mission funding.<sup>22</sup> Some critics also argue that the reduction in cost reporting associated with those pilot projects may limit the amount of information available to the Congress for its decisions about appropriations for ship maintenance.

Using the available information and data, CBO examined the potential advantages and disadvantages associated with aspects of working-capital and mission-funded ship-

yards, including cost visibility, operational and financial flexibility, shipyard performance, capital replenishment (the ability to secure enough funds to replace equipment), and economic and performance incentives. CBO found no evidence that would definitively favor the use of one financing mechanism over the other.

## The Basics of Working-Capital Funding

Before the transition to mission funding, all naval shipyards operated under some type of revolving-fund financial system, supporting their continuing operations through the income from sales of goods and services to their customers.<sup>23</sup> The National Security Act Amendments of 1949 first established working-capital funds to finance "industrial-type activities." In 1991, the Secretary of Defense created the Defense Business Operations Fund, consolidating individual industrial and stock funds (which financed parts and goods, such as petroleum) into a single revolving fund.<sup>24</sup> In December 1996, to more clearly establish functional and financial management responsibilities across the services, DoD split the Defense Business Operations Fund into individual working-capital funds for the Army, Navy, Air Force, and DoD-wide activities.<sup>25</sup> The Navy Working Capital Fund consists of "activity groups" (similar to accounts) for depot maintenance (aircraft depots still operate under working-capital funding), supply management, research and development, base support, transportation, and information services.

When the shipyards were financed through the Navy Working Capital Fund, the Congress annually appropriated funds to the Atlantic and Pacific Fleets for ship maintenance and to NAVSEA for modifications and conversions. As customers of the working-capital-funded shipyards, operational units (primarily the Atlantic and Pacific Fleets) "purchased" maintenance services, and NAVSEA "purchased" modification and conversion services (see Figure 2). The income that each shipyard received for the work it performed paid for its operations, including labor, materials, overhead, and capital

22. General Accounting Office, *Depot Maintenance: Status of the Navy's Pearl Harbor Pilot Project*, and *Depot Maintenance: Key Financial Issues*; Government Accountability Office, *Improvements Needed to Achieve Benefits from Consolidations and Funding Changes at Naval Shipyards* (September 2006); and meetings between CBO staff and officials from OSD and the DoD Inspector General's office, October 2005.

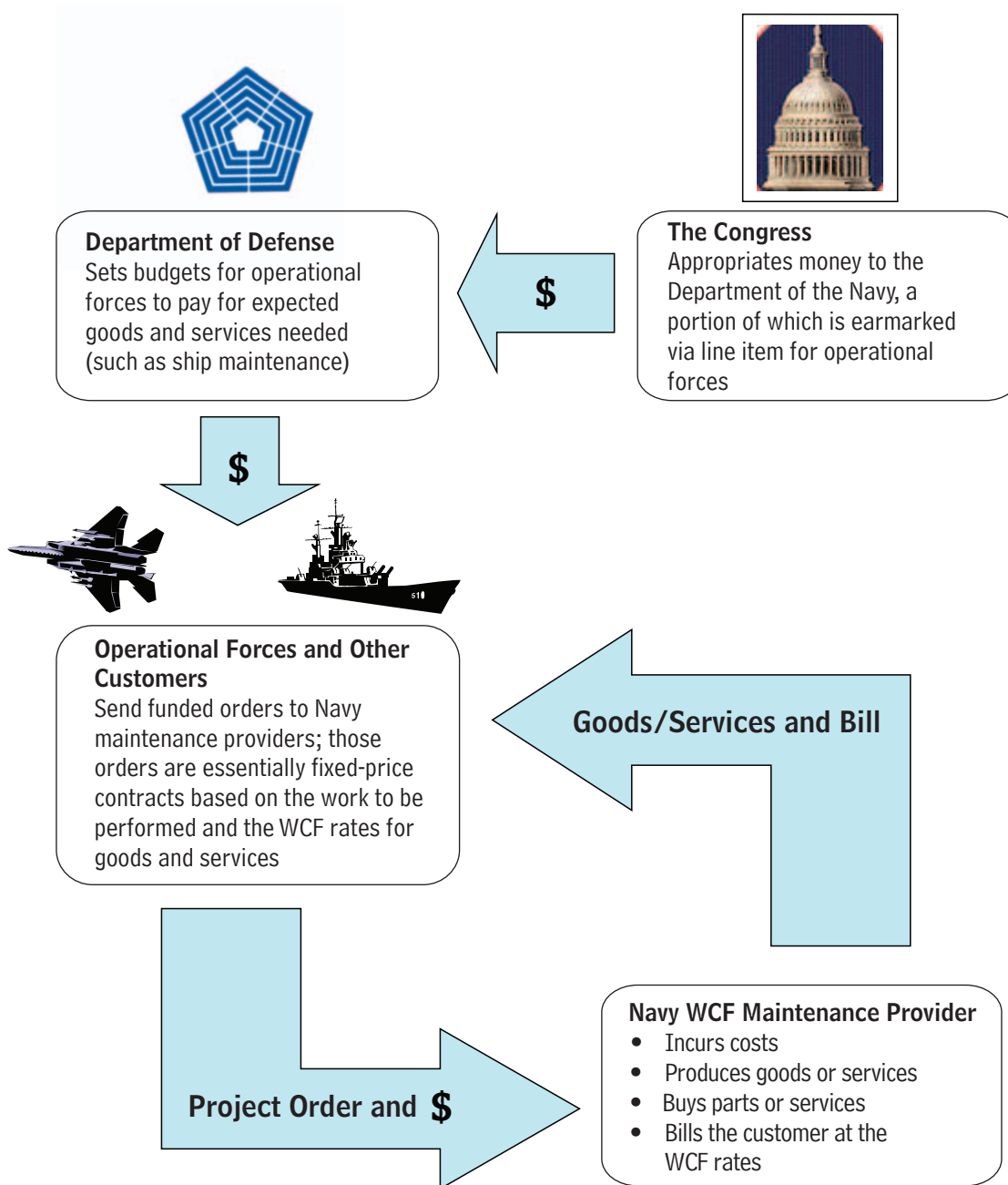
23. See Office of the Secretary of Defense, "Revolving Fund Concept" (undated), available at [www.dod.mil/comptroller/icenter/dwcf/revolvingfund.htm](http://www.dod.mil/comptroller/icenter/dwcf/revolvingfund.htm).

24. General Accounting Office, *Defense Depot Maintenance: Challenges Facing DoD in Managing Working Capital Funds*, GAO/T-NSIAD/AIMD-97-152 (June 1997), p. 6.

25. Ibid.

**Figure 2.**

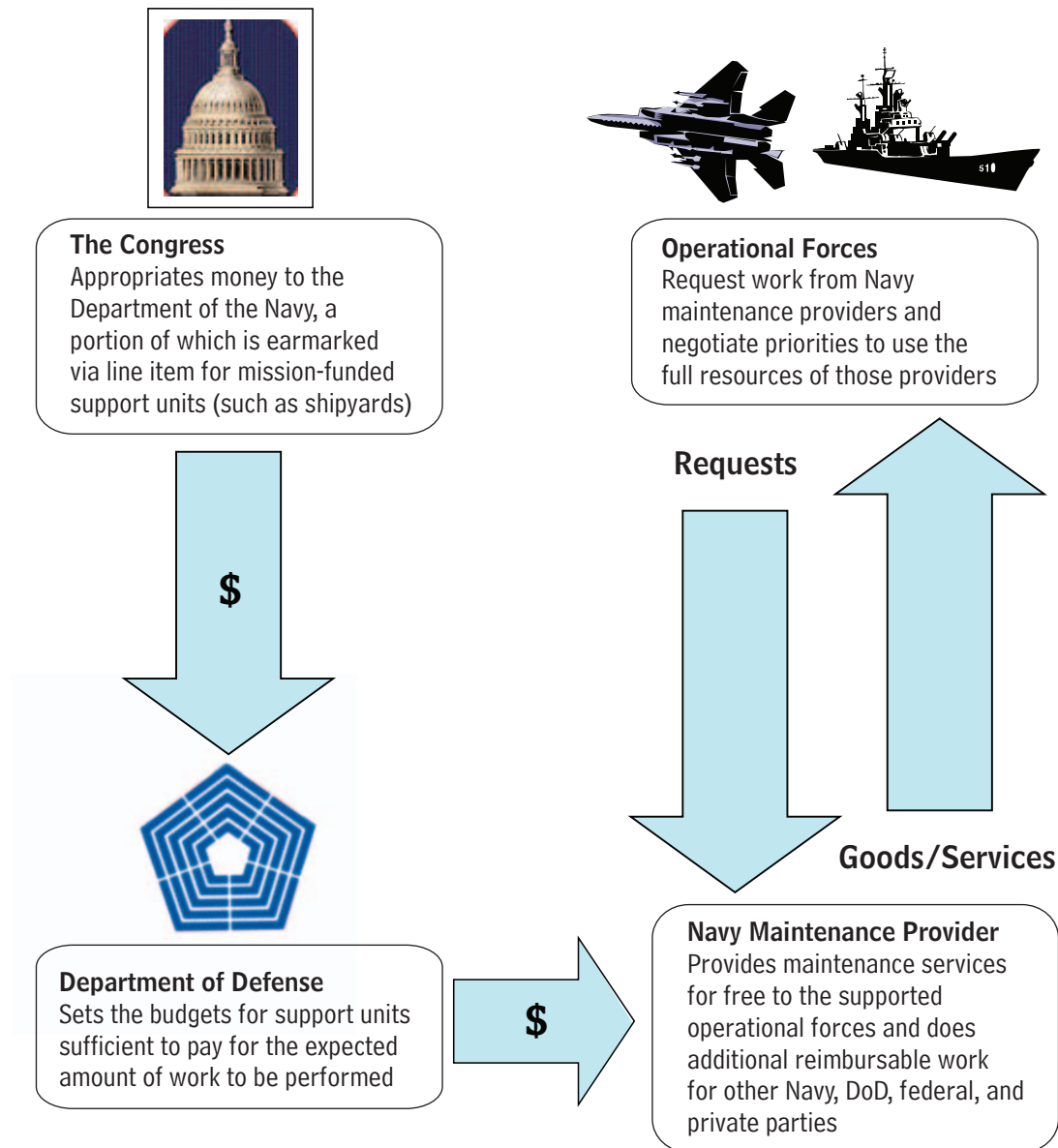
## How Working-Capital Funding Operates



Source: Congressional Budget Office based on information from the Web site of the Office of the Under Secretary of Defense (Comptroller), available at [www.dod.mil/comptroller/icenter/dwcf/revolvingfund.htm](http://www.dod.mil/comptroller/icenter/dwcf/revolvingfund.htm).

Note: WCF = working-capital funding.



**Figure 3.****How Mission Funding Operates**

Source: Congressional Budget Office.

depreciation. (Military construction is handled directly through military construction appropriations.)

The shipyards set the rates they charged on the basis of their planned workloads and to cover all of their expected costs for performing that work (except the direct costs of materials, which were billed to customers separately). Rates were tailored to particular classes of ships because certain classes (most notably nuclear-powered vessels)

require more maintenance, have higher overhead costs, and demand different skills on the part of workers than do other classes. The budgets of the shipyards' customers were set to cover the amount of depot-level work they expected to purchase at the rates in effect at the shipyards for that year. Customers obligated funds to the NWCF to cover a project order, fully funding a ship's maintenance before any work began.

Rates typically remained fixed during a fiscal year, although they could be changed during the year if specific financial criteria were met—a relatively rare occurrence.<sup>26</sup> Any differences between expected and actual demand, or differences between expected and actual costs per labor-day, could cause the shipyard to experience a net profit or loss. Annual net profits or losses (that is, the shipyard's net operating results) were incorporated into its next rate-setting cycle in an attempt to make its future accumulated operating result (a cumulative measure of net operating results) equal to zero.<sup>27</sup> Because shipyards' rates under the working-capital approach included past gains and losses, they could change significantly from one year to the next.

According to DoD, a primary purpose of its working-capital funds is to focus attention on the total costs of providing a good or service. The revolving funds are designed to enable DoD's activities to operate more like businesses, with customers and providers acutely aware of the full costs of what they buy and sell and how well they are allocating their resources.<sup>28</sup> If rates are set correctly, customers know the cost consequences of their decisions about purchases and will allocate their funds in the most effective way to serve their needs.<sup>29</sup>

26. The budget calendar necessitates that shipyards begin calculating their rates 18 to 24 months before the fiscal year in which the rates will go into effect. For detailed information about the rate-setting process, see General Accounting Office, *Foreign Military Sales: DoD's Stabilized Rate Can Recover Full Cost*, GAO/AIMD-97-134 (September 1997).

27. The Congress and the Office of the Secretary of Defense have regularly added money to the NWCF or removed it. When such transfers occur, the NWCF must adjust its net operating result accordingly.

28. For more details about revolving funds, see R. Derek Trunkey and Jino Choi, *The Defense Business Operations Fund: Problems and Possible Solutions*, CRM 95-196 (Alexandria, Va.: CNA Corporation, March 1996); W. Brent Boning and Alan J. Marcus, *An Analysis of the Navy Working Capital Fund* (Alexandria, Va.: CNA Corporation, June 1999); and Christopher H. Hanks, Will H. Horn, and John F. Olio, *Stock Fund Operations in the Department of Defense*, ML 420 (McLean, Va.: Logistics Management Institute, April 1985).

29. Charles J. Hitch and Roland N. McKean, *The Economics of Defense in the Nuclear Age* (Santa Monica, Calif.: RAND Corporation, 1960), p. 225.

## The Basics of Mission Funding

Under mission funding, by contrast with the working-capital fund approach, direct appropriations authorize DoD to incur obligations for such designated purposes as ship maintenance or modifications.<sup>30</sup> The Congress appropriates money to the Department of the Navy, a portion of which is earmarked (through line items) for operating mission-funded support units, such as shipyards. The budgets of those units are set at a level sufficient to pay for the amount of work that the unit is expected to perform (see Figure 3 on page 9).

Mission-funded shipyards provide maintenance services to the Atlantic and Pacific Fleets at no charge, but they receive reimbursement from NAVSEA for the cost of modifications and conversions. (Separate direct appropriations fund both capital expenditures and military construction at mission-funded shipyards.) However, the NWCF's procedures no longer govern the rates shipyards charge for that reimbursable work. When NAVSEA requests a modification or conversion, the shipyard charges it only for direct civilian labor and materials, a policy consistent with the guidance of the DoD *Financial Management Regulation* (DoDFMR).<sup>31</sup> For non-DoD customers (such as other federal agencies and private entities), the DoDFMR instructs shipyards to charge a fully burdened rate (that is, including all overhead costs). As of this writing, the Navy was still developing a method for calculating a fully burdened rate for the shipyards' non-DoD customers.

## Cost Visibility

The ability to calculate such financial metrics as a fully burdened rate hinges on accurate tallies of shipyards' costs. Moving a shipyard from working-capital to mission funding makes cost data less available, CBO finds. Because they are not required to do so, most of DoD's mission-funded activities, including shipyards, do not track the costs they incur to perform work. DoD's financial accounting systems track revenues and spending, but if shipyards have no need to set rates for customers that request work, they make little or no effort to link their income and expenditures to the specific work that is

30. General Accounting Office, *Depot Maintenance: Status of the Navy's Pearl Harbor Pilot Project*, p. 5.

31. See Department of Defense, Under Secretary of Defense (Comptroller), *Financial Management Regulation*, DoD 7000.14-R, vol. 11A, Chapter 1 (March 1997).

**Table 2.**  
**Examples of Overhead Costs No Longer Paid Directly by Shipyards**

Overhead Type	New Payor Under Mission Funding
Navy Marine Corps Intranet	Navy fleets
Utilities	Chief of Naval Installations
Sustainment, Restoration, and Modernization	Chief of Naval Installations
Military Labor	Bureau of Naval Personnel
Other Procurement, Navy	Naval Sea Systems Command or Navy fleets

Source: Congressional Budget Office based on information from the Department of the Navy.

performed. (For example, a maintenance facility may know the total amount it spends each year on travel but not the amount it spends for the travel associated with each repair.) In addition, mission-funded activities often manage costs separately, according to the type of appropriation (military personnel, operations and maintenance, procurement, and so forth) used to pay for them. As a result, calculating the total costs of shipyards' operations requires identifying and aggregating funds that have been appropriated to different accounts.

For example, shipyards do not track costs for overhead as closely under mission funding as they did under working-capital funding. The latter approach required that all overhead costs (except those for military construction) be accounted for and incorporated into the shipyards' rates for services. Under mission funding, overhead costs are paid by a number of commands, and shipyards account only for the overhead costs that they pay directly (see Table 2).

Working-capital funding, by design, required shipyards to identify and track costs in detail, allocating them to the work that was performed. Shipyards calculated a cost per repair and a cost per labor-day that were then published in official reports; currently, mission-funded shipyards do not regularly calculate such unit costs because no official cost reports are required.<sup>32</sup> The Navy maintains that costs are still visible after a shipyard moves to mission funding, but GAO, OSD, and DoD's Inspector General

have reported difficulty in obtaining reliable cost data from mission-funded shipyards.<sup>33</sup>

CBO also experienced problems in obtaining historical data from the Navy on its shipyards, especially for Pearl Harbor and Puget Sound after their transition to mission funding. Initially, CBO requested 10 years' of detailed data (covering the 1996–2005 period), including information on various direct and indirect costs, revenues, military and civilian labor-days and number of personnel, and capital expenditures and depreciation. (Analysis of Pearl Harbor's operations under working-capital funding required data for years prior to 1999.) The Navy provided such data for 2001 through 2005; following repeated requests by CBO, it provided data for 1996 to 2000 but only on each shipyard's direct and indirect costs, number of civilian and military personnel, and direct and indirect labor-days. Thus, for its analysis, CBO lacked the information to perform detailed comparisons of funding mechanisms over time or to calculate all of the desired metrics for evaluating the shipyards' performance.

There appears to be no inherent reason that prevents the Navy from tracking unit costs for mission-funded

32. Shipyards funded through the working-capital method were required to produce a number of different reports, including an annual report to the Congress and quarterly reports to Navy management personnel that contained more than 30 pages of detailed data on revenues, costs, hulls in progress, hulls completed, unit costs, and labor. No such comprehensive reports exist for mission-funded shipyards, although the Navy provides some data in its annual budget justification submissions and in informal, non-standardized briefings. Some users of the reports produced under the working-capital funding system have questioned the value of some of the mechanism's financial metrics. For example, the inclusion of fixed and sunk (nonrecoverable) costs in rates set under the working-capital funding method and the double counting of some revenue (when a working-capital-funded activity makes purchases from another such activity) made it difficult to interpret those metrics correctly. See Chris Hanks, "A Critical Examination of the DoD's Business Management Modernization Program," *Proceedings of the 2nd Annual Acquisition Research Symposium*, Naval Postgraduate School, Graduate School of Business and Public Policy, Monterey, California, May 1, 2005, pp. 393–423.

33. U.S. Pacific Fleet and NAVSEA, *Report on Study of Lessons Learned and Costs and Benefits of Mission Funding at Pearl Harbor Naval Shipyard* (October 2003); General Accounting Office, *Depot Maintenance: Status of the Navy's Pearl Harbor Pilot Project*, and *Depot Maintenance: Key Financial Issues*; and meetings between CBO staff and officials from OSD, the DoD Inspector General's office, and Puget Sound shipyard, October 2005.

activities, but the Navy has no reporting system in place to record those expenditures.<sup>34</sup> Although implementing such a system would involve some expense for administration and training, it would provide information to the Navy, OSD, and the Congress that all have found useful in assessing the health and performance of an operation costing several billion dollars per year and that formerly was available when all shipyards were funded through the working-capital mechanism. CBO and the Navy have identified new shipyard budget reports to improve Congressional monitoring of mission-funded shipyards that, if implemented, would force shipyards to track costs more closely. Those reports appear in CBO's *Review of Proposed Congressional Budget Exhibits for the Navy's Mission-Funded Shipyards* (April 14, 2006), which includes the Navy's *Report on Proposed Congressional Budget Exhibits for Navy Mission-Funded Shipyards* (March 2006).

### Operational Flexibility

Another important area of comparison between working-capital funding and mission funding is the flexibility each system provides for managing shipyards' workforces and workloads—that is, the ability to move resources (particularly workers) between projects within a shipyard as well as between facilities. The Navy believes that mission funding is superior to working-capital funding in terms of sharing resources, matching the skills of workers with the priorities of the fleets, and reallocating funding as necessary.

Sharing resources between maintenance facilities is a critical element of the Navy's Regional Maintenance Plan. Shifting workers between projects, as dictated by the Navy's ship maintenance workload at any given time, can mitigate the possibility of labor shortages or surpluses and of schedule delays. Under mission funding, labor costs are already fully funded, so transferring workers requires a minimal amount of paperwork and no exchange of funding documents between the customer and the shipyard. By contrast, under the working-capital approach, labor costs had to be funded through customer obligations before workers could start on a project; consequently, sharing resources between projects required more paperwork, and in some cases, the ensuing delay could lead to

idled workers and delayed maintenance. (One way the fleets circumvented that problem under the working-capital approach was to “buy” a planned number of labor-days at the beginning of a fiscal year. Through such an arrangement, the Norfolk shipyard, for example, provided about 100 civilian workers to support the nearby intermediate-level maintenance facility.)

The need to shift resources is most pronounced when a major change in the schedule of availabilities occurs. An unscheduled availability for a ship, such as might occur after a collision or as a result of an unexpected surge in ship deployments because of an armed conflict, could generate significant shortages or surpluses of workers.<sup>35</sup> Shipyard officials say that under mission funding, they have improved their ability to respond to unexpected changes in scheduled availabilities. If a ship is damaged, mission-funded shipyards can shift resources to that ship quickly and easily (most likely by delaying other, less urgent availabilities). If a shipyard is scheduled for an availability that does not occur, that shipyard can quickly direct its resources toward another of its ongoing projects or toward projects at other facilities (such as the nearest intermediate-level facility).

Yet for decades, shipyards that operated under the working-capital funding system responded to similar changes in availability schedules—although the requirement to fully obligate funding before work was begun sometimes caused inefficiencies. According to the Navy, as many as 1,000 skilled workers were left idle at the Norfolk shipyard following the unscheduled deployments of ships during Operation Desert Storm. The maintenance funds that had been budgeted for the deployed ships were not used to finance other work for the fleet because the Navy still expected to “induct” the scheduled work into the yard before the end of the year. The excess personnel created operating losses that had to be recovered through higher rates for services in subsequent years. Emergency maintenance needs could be addressed under the working-capital approach: A shipyard's commander could establish an unfunded cost order to begin work immediately (though at some financial risk to the shipyard), with the expectation that the damaged ship's fleet would soon arrange to reimburse those costs.

34. Naval Postgraduate School, *Unit Cost Handbook* (undated), available at [www.nps.navy.mil/drmi/98handbooks.htm](http://www.nps.navy.mil/drmi/98handbooks.htm); and Kent Miller, “Unit Costing Outside DBOF,” *Resource Management* (May 1992), p. 12.

35. However, depot-level availabilities are not shifted between facilities once the work has been programmed for a particular shipyard.

Although major shifts in depot-level maintenance schedules can be significant, they seldom occur. Submarines, for example, typically do not deviate from their maintenance schedules because they have strict safety requirements. Schedule deviation as a result of extensive damage to a ship is infrequent as well. According to data provided by the Navy Safety Center, from 1997 to 2006, only eight accidents to a ship or submarine generated more than \$10 million of damage to DoD property. (That amount represents the smallest work package typically performed at a shipyard.)

The advantage of sharing workers, CBO finds, probably affects only a small fraction of a shipyard's total workforce at any given time. According to data provided by the Navy and conversations with some of its personnel, the use of overtime is the primary means of matching a shipyard's workload with its workforce—regardless of how the facility is being funded. Shipyards typically take on a slightly larger workload than they can handle during regular hours, and they make up the difference through overtime (see Figure 4). At times, however, shipyards may experience shortages or surpluses of specific skills that overtime alone will not resolve. Those instances may call for sharing workers between facilities.

A potential drawback under mission funding of freely shifting workers between shipyards and intermediate-level facilities is that it may interfere with the Navy's ability to verify its compliance with the "50-50 rule." Under title 10, section 2466, of the U.S. Code, no more than 50 percent of the Navy's annual depot-level maintenance may be provided by private contractors.<sup>36</sup> Because the rule does not apply to intermediate-level maintenance, the Navy must distinguish in its recordkeeping between the two kinds of work, which may become more difficult if resources are shifted between maintenance levels on a regular basis. According to the Navy, however, sharing resources does not hinder its 50-50 reporting because labor costs are assigned to specific maintenance jobs—which are known as customer order account records, or COARs—that are categorized as intermediate- or depot-level work. (A shipyard generally creates hundreds of COARs in a year.)

36. For more information about the 50-50 rule and reporting, see General Accounting Office, *Depot Maintenance: DOD's 50-50 Reporting Should Be Streamlined*, GAO-03-1023 (September 2003).

## Operational Performance

To address concerns about whether the Navy has developed appropriate metrics to objectively compare a shipyard's performance before and after the shift from working-capital to mission funding, CBO analyzed a set of factors designed to measure performance over time (see Table 3). Although no single metric is an accurate gauge of the success of shipyards' operations, CBO chose several measures that, when considered together, would provide some indication of how well a shipyard is operating. The Navy, however, was unable to provide data to support analysis of all of those metrics, or the data that it did supply in some cases appeared inconsistent and potentially unreliable. CBO thus was able to calculate only the following measures of shipyard operations: schedule adherence, total annual costs, cost per ship availability, burdened labor rate, and administrative efficiency. CBO found no link between a shipyard's funding mechanism and its operational performance as indicated by those metrics.

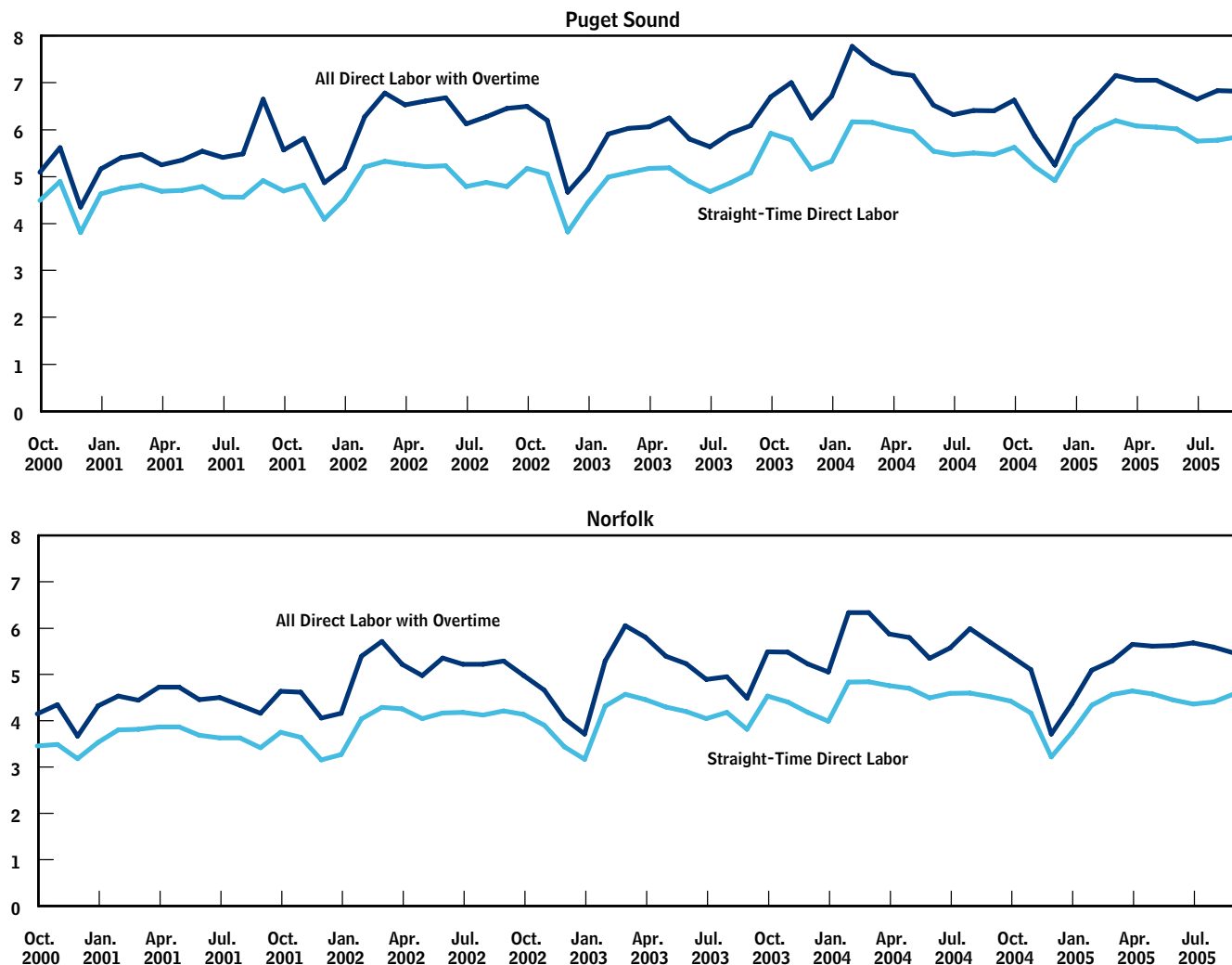
**Schedule Adherence.** Shipyards must complete availabilities on schedule to avoid disrupting the Navy's operational plans. Availabilities that are delivered late can reduce the service's readiness as well as delay the induction of future availabilities, as incoming ships wait for docking space at the shipyard.

The Navy provided CBO with various data, including scheduled and actual completion dates, on individual availabilities completed between 1995 and 2005.<sup>37</sup> CBO calculated the schedule adherence metric by dividing the sum of the total amount of time that availabilities at a shipyard were late in a given year (determined by comparing actual with scheduled completion dates) by the total amount of time worked on availabilities that year (see Figure 5 on page 17). (CBO considered early deliveries equivalent to on-time deliveries, because early completion of an availability is probably no more beneficial to the Navy's operational schedule than on-time delivery.) According to CBO's analysis, a shipyard's funding mechanism does not appear to affect its ability to adhere to its schedule.

37. The Navy's data for some availabilities lacked either the scheduled or actual completion dates. CBO thus omitted those availabilities, which occurred primarily during the 2004–2005 period, from its metric calculation.

**Figure 4.****Shipyards' Use of Overtime to Increase Available Labor**

(Available workforce, in thousands)



Continued

Caution regarding that finding is warranted, however, because the data on availabilities may be inconsistent. The Navy provided the data in two separate sets and at different times; one set covered availabilities between 1995 and 2001, and the other, those between 2001 and 2005. Data on availabilities in 2001 (the overlapping year) in one data set did not always match data for 2001 in the other set. Consequently, CBO cannot determine whether the apparent Navy-wide improvement in schedule adherence that began in 2002 is due to a genuine reduction in the number of availabilities completed late or whether it reflects other factors, such as late availabili-

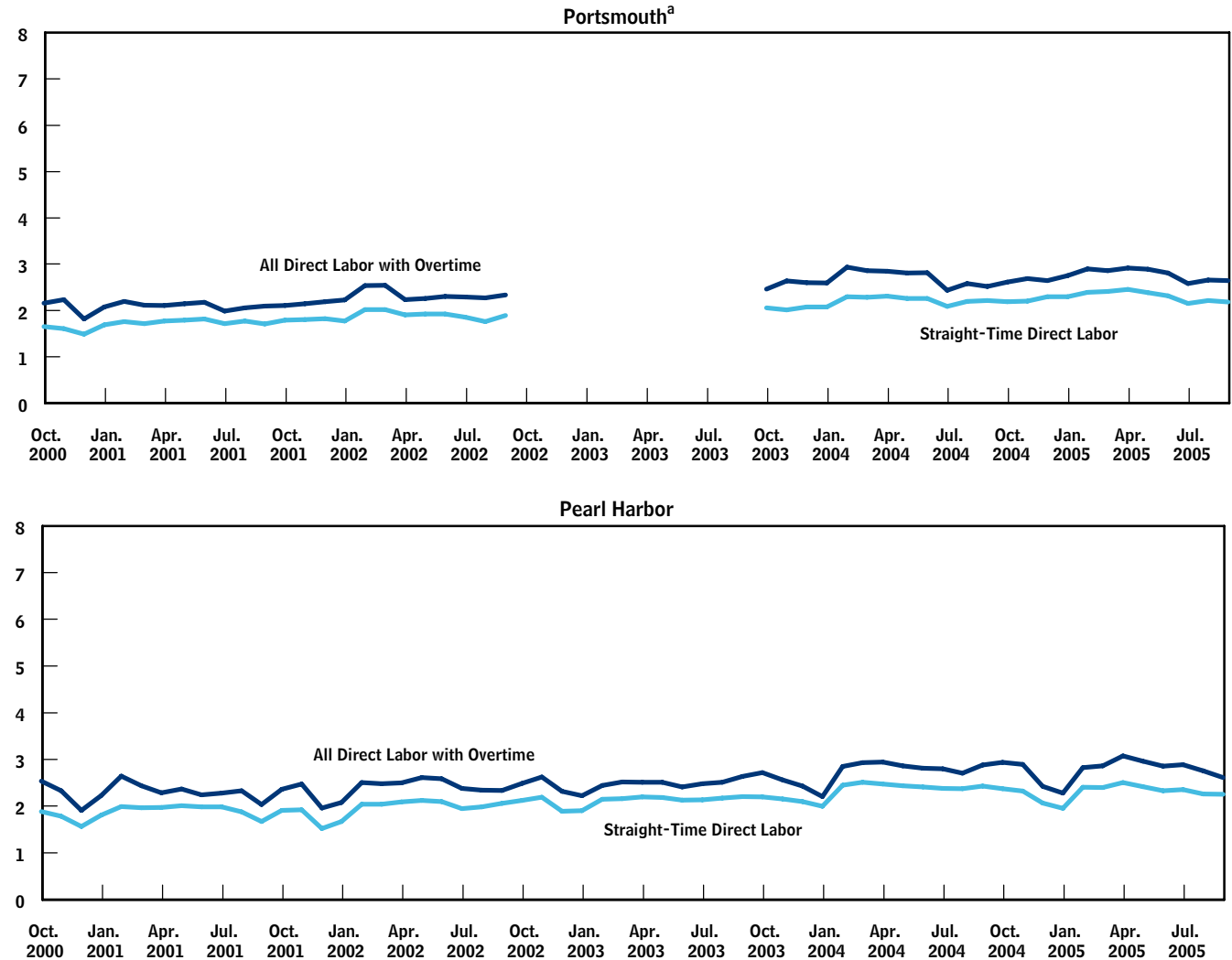
ties that went unreported, planned schedules that were inflated, or inconsistencies in the data.

**Quality of Work.** Another significant metric of shipyard performance is the quality of the work performed. Maintenance and repair work done right the first time prevents duplication of effort during an availability and after its delivery, eliminating reworking that can cause delays and generate additional labor and material costs. The Navy did not provide CBO with the kind of data needed to consistently measure the quality of work across all shipyards and over time. (Such data probably do not exist for

**Figure 4.**

## Continued

(Available workforce, in thousands)



Source: Congressional Budget Office based on data from the Department of the Navy.

a. Workforce data for 2003 are missing.

mission-funded shipyards.) Both the Navy and CBO have proposed metrics that could be used in the future to assess quality, including the amount of labor required to correct deficiencies in work, the readiness levels of ships and submarines serviced at the shipyards, and the percentage of sea trials that are successfully completed on the first attempt following the maintenance work.<sup>38</sup>

**Cost Management.** Several metrics indicate how well a shipyard is controlling costs. An overall cost metric, total annual costs, measures all direct and indirect costs of

operating a shipyard (see Figure 6). Such a metric requires the consistent inclusion of costs across shipyards and over time, and CBO is uncertain whether the data that the Navy provided meet that requirement. As

38. See Congressional Budget Office, *Review of Proposed Congressional Budget Exhibits for the Navy's Mission-Funded Shipyards* (April 2006); and (included in CBO's report) Department of the Navy, *Report on Direct Funding for Puget Sound Naval Shipyard and Report on Proposed Congressional Budget Exhibits for Navy Mission-Funded Shipyards* (March 2006).

**Table 3.****Performance Metrics for Shipyards**

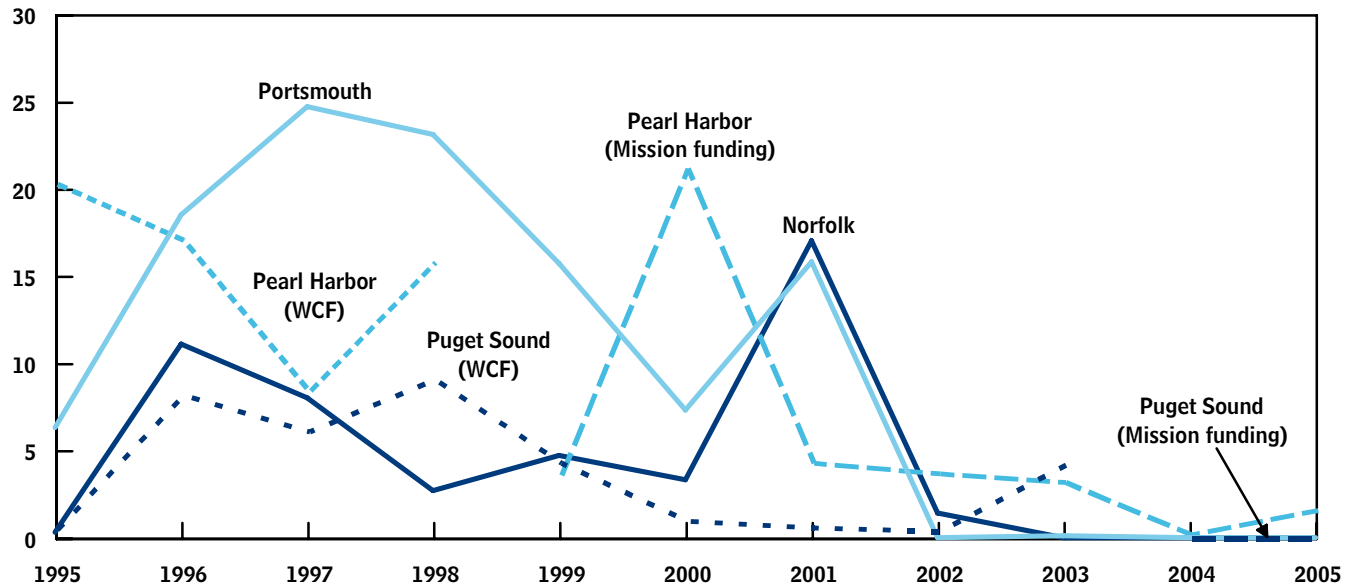
Metric	Calculation	Potential Weaknesses of Metric	Result
<b>Schedule Adherence</b>			
Deviation from Planned Schedule	Total weeks late divided by total scheduled weeks	<ul style="list-style-type: none"> <li>• Sample is small</li> <li>• Factors outside of shipyards' control may cause deviation from schedule</li> <li>• Planned schedule could be inflated to influence metric</li> </ul>	Funding mechanism does not appear to affect performance
<b>Quality of Work</b>			
Rework Required to Correct Work Deficiencies	Rework labor-days divided by total direct labor-days	<ul style="list-style-type: none"> <li>• Reliable historical data may not be available</li> </ul>	No consistent data available across shipyards or over time
Ship Readiness	No agreed-upon metric that links maintenance to readiness	<ul style="list-style-type: none"> <li>• Changes in ship readiness may be due to factors other than shipyards' performance</li> <li>• Reliable historical data may not be available</li> </ul>	No consistent data available across shipyards or over time
<b>Cost Management</b>			
Total Annual Costs	Sum of direct and indirect military and civilian labor, direct materials, and overhead costs	<ul style="list-style-type: none"> <li>• Shipyards must include the same cost categories over time</li> <li>• Mission-funded shipyards may have difficulty calculating overhead costs</li> </ul>	Funding mechanism does not appear to affect performance; CBO cannot verify that the Navy's data are consistent across shipyards or over time
Burdened Labor Rate	Total annual costs divided by total annual direct labor-days	<ul style="list-style-type: none"> <li>• Shipyards must include the same cost categories</li> <li>• Mission-funded shipyards may have difficulty calculating overhead costs</li> </ul>	CBO cannot separate the effect of merging intermediate- and depot-level facilities from the funding mechanism's effect
Cost per Ship Availability	Direct labor-days worked on a ship multiplied by the burdened labor-day rate	<ul style="list-style-type: none"> <li>• Sample is small</li> <li>• Availabilities, even within a ship class, have varying work requirements</li> <li>• Mission-funded shipyards may have difficulty calculating a burdened rate</li> <li>• Mission-funded shipyards may have difficulty distinguishing between intermediate- and depot-level costs</li> </ul>	Funding mechanism does not appear to affect performance
<b>Administrative Efficiency</b>			
Ratio Between Direct and Total Labor-Days	Direct labor-days divided by total labor-days	<ul style="list-style-type: none"> <li>• Mission-funded shipyards may have difficulty distinguishing between intermediate- and depot-level labor-days</li> <li>• Metric may encourage shipyards to categorize most costs as direct</li> </ul>	Funding mechanism does not appear to affect performance

Source: Congressional Budget Office.



**Figure 5.****Shipyards' Schedule Adherence**

(Ratio of total weeks late to total weeks scheduled)



Source: Congressional Budget Office based on data from the Department of the Navy.

Notes: Breaks in the data for Puget Sound and Pearl Harbor Shipyards indicate the facilities' transition to mission funding.

WCF = working-capital funding.

previously discussed, the transition to mission funding shifted the responsibility for some of the shipyards' overhead costs to other offices; the data that CBO received may not uniformly account for those costs. Also, the total cost data for the Puget Sound and Pearl Harbor shipyards include intermediate-level costs incurred in the years following the two shipyards' switch to mission funding. Nevertheless, under the assumption that the data are reasonably accurate, the metric indicates that total annual costs have generally increased for all shipyards and have not been noticeably affected by the shift to mission funding.

A second metric that can help indicate how well shipyards are controlling costs is the fully burdened labor-day rate, calculated by dividing total costs by total direct labor-days (see Figure 7). Essentially, the fully burdened labor rate of a shipyard is its total costs adjusted for the amount of work performed. (Because of their smaller size, Portsmouth and Pearl Harbor shipyards generally have higher labor rates than the other two shipyards because the smaller yards' fixed overhead costs are distributed across fewer labor-days.) Pearl Harbor and Puget Sound, after their transition to mission funding and their integra-

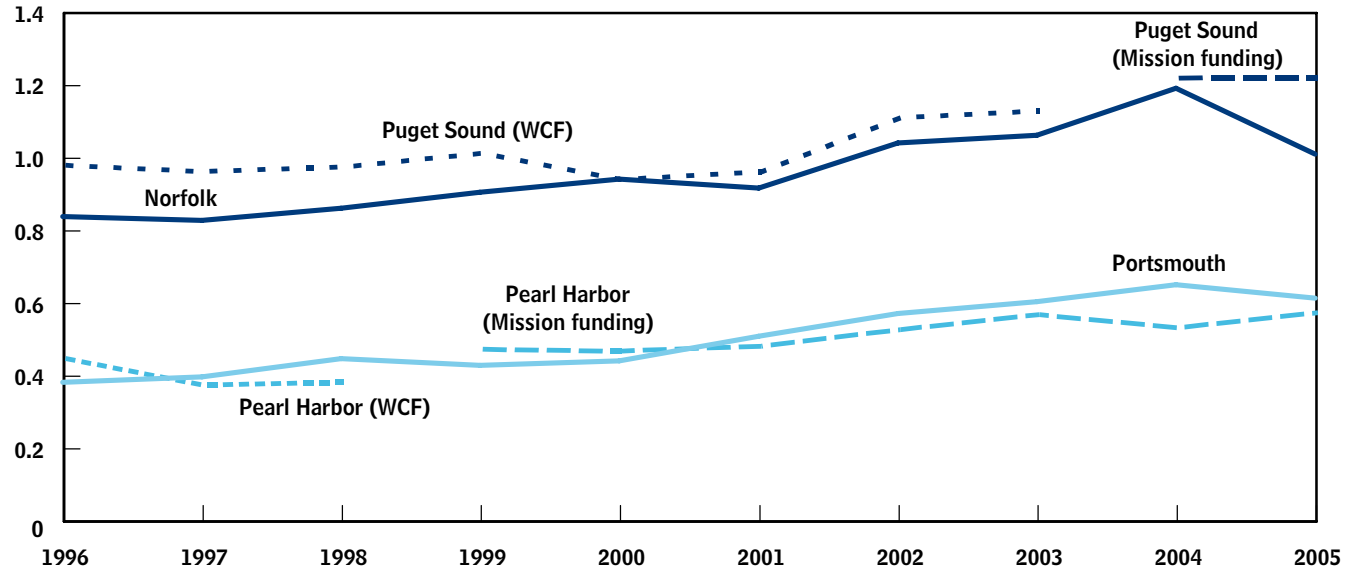
tion with intermediate-level facilities, experienced a decrease in their burdened rates. CBO believes, however, that those drops can be explained by changes in the types of labor and costs included in the metric. (Specifically, the fully burdened labor rate of integrated maintenance facilities includes intermediate-level labor-days, but some of the intermediate-level indirect costs may have been omitted, thus inflating the metric's results.)

The final cost metric that CBO analyzed was a calculation of costs per availability. To compare costs across shipyards, CBO controlled for the type of availability and the class of the ship. For only one combination of those classifiers—DSRA maintenance on Los Angeles-class submarines—did CBO have adequate data for a comparison (see Figure 8).<sup>39</sup> Those data show considerable variability in costs per availability, which is probably the result of differences in the specific maintenance needed for each

39. DSRA (docking selected restricted availabilities) are regularly scheduled depot-level maintenance for submarines. Types of availabilities are described in Department of the Navy, Office of the Chief of Naval Operations, *OPNAV Instruction 4700.7K*

**Figure 6.****Shipyards' Total Annual Costs**

(Billions of 2006 dollars)



Source: Congressional Budget Office based on data from the Department of the Navy.

Notes: Data on total costs for the Puget Sound and Pearl Harbor Shipyards, as provided by the Navy, include intermediate-level maintenance costs in the years following the shipyards' switch to mission funding. Breaks in the data for those shipyards indicate the facilities' transition to mission funding.

WCF = working-capital funding.

ship (no two availabilities are exactly the same). However, the data indicate no relationship between a shipyard's funding mechanism and its cost performance on a per-availability basis.

**Administrative Efficiency.** The ratio between direct labor-days and total (direct plus indirect) labor-days can indicate a shipyard's administrative efficiency—that is, how efficient it is in using its workforce (see Figure 9 on page 21). Direct labor-days are those used in performing actual maintenance, either on specific availabilities or on more-general equipment maintenance. Indirect labor-days are those used on any tasks other than maintenance, such as management, office support, and administration.

The data show that the share of direct labor-days generally increased at all shipyards between 1996 and 2005. An increase in the total direct labor-days (the numerator in the metric) was the primary cause of the measured improvements in administrative efficiency, although in the case of Puget Sound, another contributor may have been a sharp decline in indirect labor-days, which the

shipyard experienced between the years 1996 and 2000. The shift to mission funding has not noticeably affected this metric.<sup>40</sup>

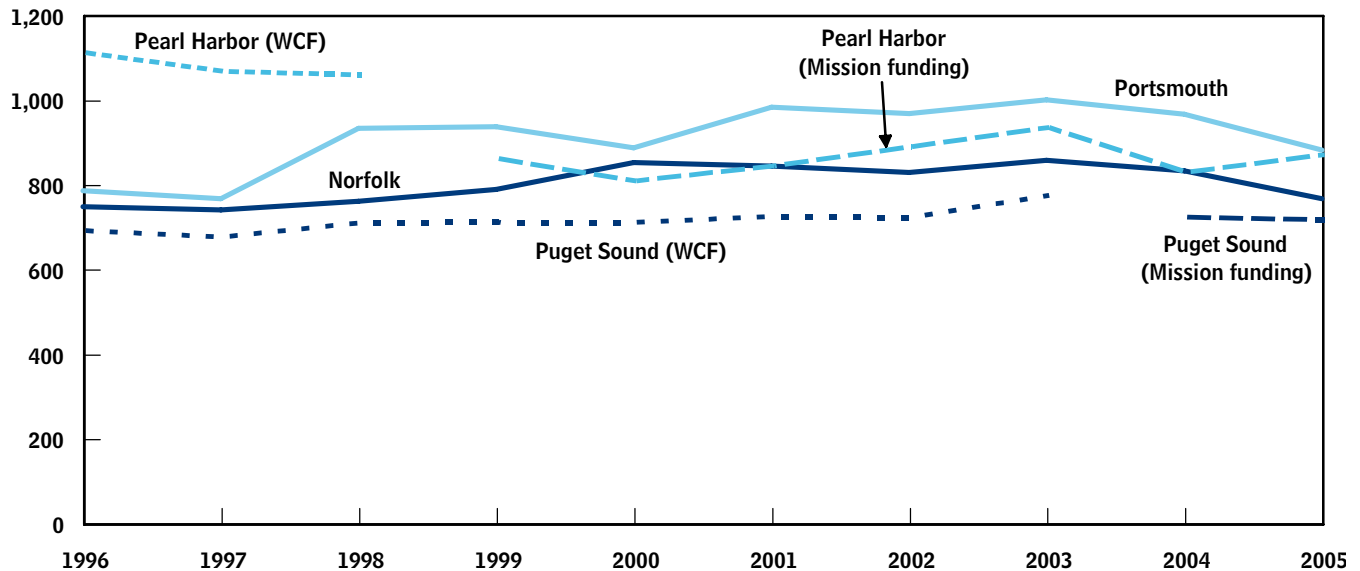
**Capital Replenishment**

Some observers worry that mission-funded shipyards will find it difficult to secure appropriations for their capital expenses (purchases for such items as dock cranes and machining equipment). Shipyards that operated under working-capital funding made their own plans for replacing capital items and included the cost of needed equip-

40. Performance metrics generally indicate that Pearl Harbor's operations are not as efficient as those of the other naval shipyards. Officials at Pearl Harbor speculate that its worse-than-average performance may arise from a number of factors, including the shipyard's smaller size (leading to fewer economies of scale), a smaller local workforce from which to hire, a large number of homeported submarines that require rapid turnaround maintenance (possibly at the expense of other availabilities), and more repairs resulting from corrosion (because of the warmer water). According to the Navy, those problems predate Pearl Harbor's transition to mission funding.

**Figure 7.****Shipyards' Burdened Labor-Day Rates**

(2006 dollars)



Source: Congressional Budget Office based on data from the Department of the Navy.

Notes: The burdened labor-day rate equals total costs divided by total direct labor-days.

Breaks in the data for Puget Sound and Pearl Harbor Shipyards indicate the facilities' transition to mission funding.

WCF = working-capital funding.

ment in their rates. By contrast, under mission funding, shipyards must compete with other components of the Navy for money from within the "Other Procurement, Navy" accounts. On the basis of the data available on shipyards' capital spending (which cover only aggregate expenditures over the past 10 years), CBO found that the level of capital-expenditure funding appears to be independent of a shipyard's financing system (see Table 4). However, it could be argued that the data for the Pearl Harbor and Puget Sound shipyards under mission funding are inconclusive, because they cover a period that is less than the average service life of those shipyards' equipment.

### Incentives for Shipyards' Customers and Managers

Working-capital funding and mission funding introduce different economic and performance incentives for shipyards' customers and managers.<sup>41</sup> Either financing mechanism may encourage customers to make inefficient decisions: Working-capital funding may lead to the underutilization of shipyards, whereas mission funding may lead to their overutilization. Additionally, the fleets have increased their influence under mission funding, in terms of planning and prioritizing work at the shipyards.

One criticism of working-capital funding has been that, in an effort to focus attention on total costs, shipyards under such systems set rates for their services by using expected-average-cost pricing rather than marginal-cost pricing.<sup>42</sup> The rates shipyards charged customers under working-capital funding were based on total projected costs—including the accumulated results of prior years—

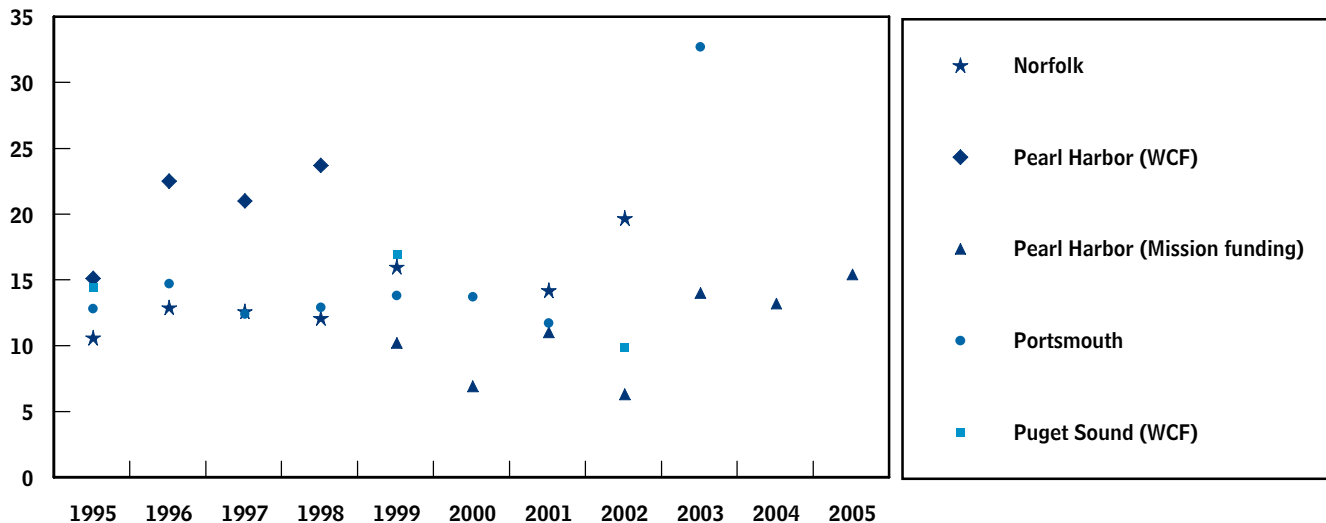
41. A number of papers have thoroughly addressed the economics of revolving funds, including Boning and Marcus, *An Analysis of the Navy Working Capital Fund*; Edward G. Keating, *RAND Research Suggests Changes in Department of Defense Internal Pricing*, IP-216-DFAS (Santa Monica, Calif.: RAND, 2001); Edward G. Keating and others, *Challenges in Defense Working Capital Fund Pricing: Analysis of the Defense Finance and Accounting Service* (Santa Monica, Calif.: RAND, 2003); William P. Rogerson, *On the Use of Transfer Prices Within DoD* (McLean, Va.: Logistics Management Institute, 1995); and Trunkey and Choi, *The Defense Business Operations Fund*.

42. In general, basing prices on marginal costs will lead to efficient decisions. See Jack Hirshleifer, "On the Economics of Transfer Pricing," *Journal of Business*, vol. 29, no. 3 (July 1956), p. 172.

**Figure 8.**

### Average Costs to Perform DSRA-Type Maintenance on Los Angeles-Class Submarines

(Millions of 2006 dollars)



Source: Congressional Budget Office based on data from the Department of the Navy.

Notes: No data were available for the Puget Sound Shipyard under mission funding.

DSRA = docking selected restricted availability; WCF = working-capital funding.

and projected workloads for a given year.<sup>43</sup> Total costs thus included fixed and sunk costs that were independent of the amount of work the shipyards performed, as well as costs that varied according to shipyards' workloads. Consequently, the prices that shipyards charged customers for a specific task exceeded the marginal (additional) cost of the work performed. If customers viewed those rates as too high, they might have reduced the scope of work they wanted performed at the shipyard, deferred maintenance, or (if possible) shifted to a new maintenance provider (such as an intermediate-level maintenance facility) that operated under mission funding and did not include fixed costs in its prices.<sup>44</sup>

43. Because rates under the working-capital system were set more than a year in advance, they did not necessarily reflect current costs.

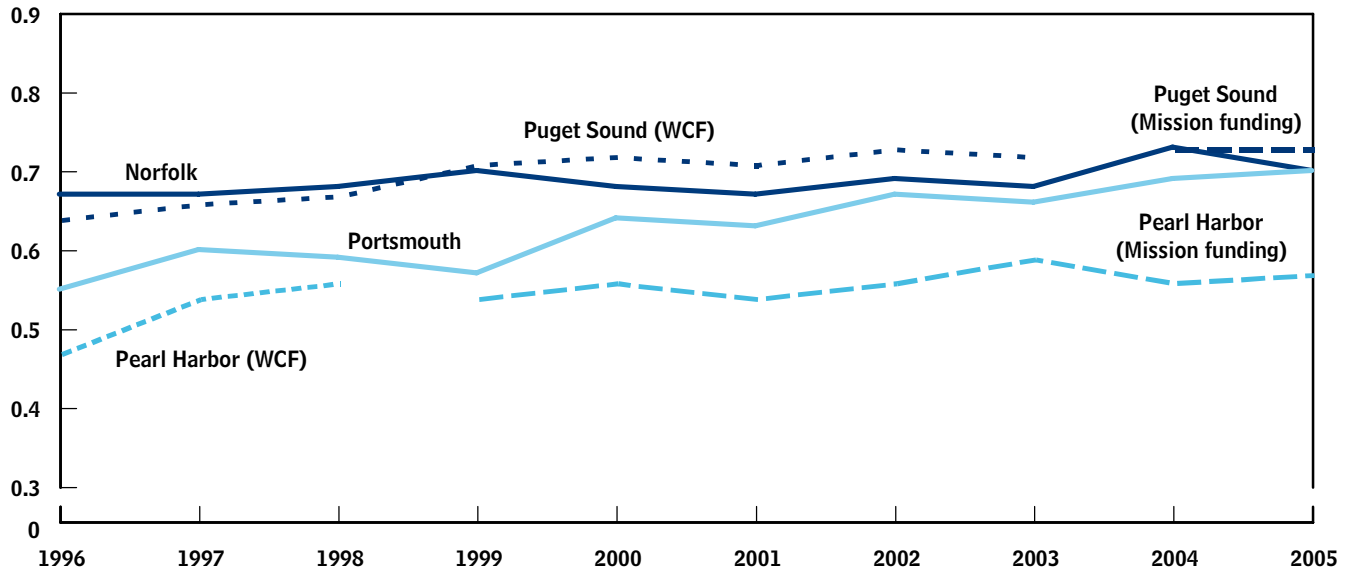
44. Another general criticism of activities that operate under working-capital funding is that their prices are the same for different types of work. As a result, because some types of work are inherently more expensive than others to perform, working-capital funding may lead to the subsidization of some customers by others. However, the fact that the Navy's shipyards tailor their rates on the basis of a ship's class reduces customer cross-subsidization.

Despite some customers' perception that mission-funded maintenance providers are less expensive than shipyards operating under a working-capital system, the total cost to the Navy of performing a maintenance task (including all fixed costs) might be higher or lower at a mission-funded facility. Thus, if customers had avoided shipyards whose rates were set under a working-capital system, they might inadvertently have selected a more costly maintenance provider. For shipyards operating under working-capital funding, lost business might have created dips in workload and excess labor capacity—and, when a net operating loss occurred, surcharges that would be included in future rates to recoup losses. Analysts proposed several changes to mitigate those problems, such as introducing "membership dues" to cover fixed costs, allowing regular adjustments to rates during a fiscal year, and returning profits (or charging losses) directly to the fleet or to the Chief of Naval Operations. Those suggested changes, however, were not implemented at the naval shipyards.

There are some characteristics of naval ship maintenance that weaken the pricing incentives of working-capital funds. Because the Navy's ship facilities as well as those in

**Figure 9.****Shipyards' Administrative Efficiency**

(Ratio of direct labor-days to total labor-days)



Source: Congressional Budget Office based on data from the Department of the Navy.

Notes: Breaks in the data for Puget Sound and Pearl Harbor Shipyards indicate the facilities' transition to mission funding.

WCF = working-capital funding.

the private sector tend to specialize in certain types of vessels and maintenance work, and because the fleets tend to align themselves with shipyards on one coast or the other, competition among providers is limited. Also, work is assigned to shipyards years in advance, and the Navy actively spreads work across the shipyards to maintain their capabilities. Consequently, shipyard assignments are primarily driven by a facility's location and docking space, not by price.

Pricing under mission funding, by contrast, may encourage customers to overutilize a shipyard. Once a mission-funded shipyard receives its annual appropriation, the cost to the fleet of repairing a ship there is zero (other than waiting time). For reimbursable work, shipyards currently charge customers only for direct labor and materials—they do not charge a fully burdened rate.<sup>45</sup> Low prices encourage customers to send as much work to mission-funded shipyards as possible and virtually guarantee that the shipyards' available labor will always be busy. However, in that case, customers may requisition

work that they would not request if they were directly responsible for paying for its full cost, leading to inefficient use of the Navy's resources.

The mechanism used to fund a shipyard's operations may also affect the relative influence of customers and shipyards on its prioritization of work. Under working-capital funding, shipyards made most of the decisions about how to prioritize the work that was currently at the yards, decisions that emphasized schedule deadlines and net operating results. Under mission funding, the fleets are more involved in decisions about shipyards' workloads, and the priorities of the shipyards align more closely with those of the fleet. According to the shipyards and the fleets, more joint decisionmaking about maintenance schedules occurs under the mission funding system than occurred under the working-capital approach. The way work is prioritized and the influence of customers under mission funding have led to a few cases of shipyards' moving a substantial number of workers from one availability to another to complete the former availability early at the expense of the latter's being late. That situation seldom occurred in shipyards operating under a working-

45. The cost of direct labor and materials may approximate the marginal cost of a maintenance job.

**Table 4.****Shipyards' Capital Expenditures**

(Millions of 2006 dollars)

Shipyard	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Pearl Harbor										
Working-capital funding	4.2	14.0	7.9	*	*	*	*	*	*	*
Transition year	*	*	*	12.0	*	*	*	*	*	*
Mission funding	*	*	*	*	6.4	22.0	25.2	25.7	16.9	9.2
Puget Sound										
Working-capital funding	18.0	10.7	20.7	16.5	10.8	15.8	18.0	11.4	*	*
Mission funding	*	*	*	*	*	*	*	*	23.5	9.7
Norfolk (Working-capital funding)	19.0	23.4	22.4	21.6	44.7	17.2	35.6	17.3	16.5	21.6
Portsmouth (Working-capital funding) <sup>a</sup>	13.4	10.6	4.1	8.5	5.5	34.7	84.1	16.5	5.6	3.6

Source: Congressional Budget Office based on data from the Department of the Navy.

Note: \* = not applicable.

a. The Portsmouth Shipyard experienced a substantial increase in capital expenditures in 2002, largely as a result of a \$57 million purchase of Enterprise Resource Planning software and hardware for use at all naval shipyards.

capital funding system.<sup>46</sup> Because the fleets' priorities are more likely to reflect current operational needs, mission funding may lead to better use of the Navy's resources.

However, dividing a mission-funded shipyard's workload along financial lines—between work from the fleet and reimbursable work from NAVSEA—may cause work to be prioritized according to its funding rather than its urgency or importance. The funds allocated by the fleet for operation of the shipyard are generally fixed for the fiscal year. If some work for the fleet that was planned for a certain year cannot be performed during that time, the work is simply carried over to the next year. But the funds that the shipyard receives from NAVSEA for work done on a reimbursable basis are only due when the work is finished—although generally, funds are paid out periodically, as milestones are reached. If a shipyard plans to perform a certain amount of reimbursable work but is not able to actually perform that work and collect payment for it, the shipyard may expend more funds than it has available, a potential violation of the Antideficiency Act.<sup>47</sup> Thus, mission-funded shipyards may prioritize

work on the basis of its funding (reimbursable versus mission funding) rather than on the operational needs of the fleet or the shipyard. When shipyards operated under working-capital funding, there was no such distinction between carrying over work from the fleets or from NAVSEA.

Working-capital funding and mission funding also provide incentives to shipyards to improve their performance—but through different mechanisms. Under working-capital funding, a shipyard's customers and managers might have instigated improvements. If customers considered prices too high, they might have complained to the shipyard, deferred maintenance, or reduced the scope of work. Moreover, because all costs under working-capital funding were identified and tallied to determine rates for work, managers had access to a variety of cost measures for use as performance metrics. At the Department of the Navy and DoD levels, managers could keep tabs on the total costs of operating the shipyard in the context of overall budgets. At the facility level, managers could identify abnormally high costs for performing particular kinds of work and in turn seek efficiencies.<sup>48</sup> Examining a shipyard's rates over time offered

46. Statement of Vice Admiral Justin D. McCarthy, April 4, 2006.

47. An overview of the provisions of the Antideficiency Act is provided in Government Accountability Office, *A Glossary of Terms Used in the Federal Budget Process*, GAO-05-734SP (September 2005). The law itself can be found at 31 U.S.C. 1341.

48. The Navy's shipyards do not face the same profit motives as do private firms, which may reduce the shipyards' incentive to control costs. See Trunkey and Choi, *The Defense Business Operations Fund*, p. 25.

an indication of whether performance was improving or worsening. If a shipyard consistently operated over or under its capacity, such information might have signaled that the shipyard was incorrectly sized.

Under mission funding, the Atlantic or Pacific Fleet, as the shipyard's owner and primary customer, is largely responsible for instituting improvements in a facility's performance. If a shipyard's productivity improves, the fleet as the customer can direct additional work to it. Alternatively, the fleet as the owner can reprogram the savings from that improvement for other uses. Yet the absence under mission funding of established, detailed cost accounting may make it difficult for the fleet to determine the full cost of operating the shipyard, the costs of specific maintenance tasks, and the operational areas most in need of improvement. Furthermore, a shipyard's poor performance may be considered a minor issue in the context of the fleet's total operations and budget. As noted earlier, a mission-funded shipyard is always busy because once it has been funded, the incentive for the fleet is to get as much work as possible from it. Thus, no workload indicator is available to determine whether the shipyard is appropriately sized. Properly sizing a shipyard requires additional analysis, whereby the fleet (or the Navy) weighs the value of the work being performed against its cost, a comparison that is not as readily visible under mission funding as under the working-capital approach.

### Other Issues

CBO examined several other issues associated with the Navy's shift from working-capital funding to mission funding of its shipyards. When a shipyard switches to mission funding, the Navy must pay for assets whose value the Navy Working Capital Fund has not yet recovered. Those costs, known as buyout costs, include undepreciated capital assets, accrued employee leave, accounts payable less accounts receivable, and accumulated operating results. Buyout costs arise because costs under the working-capital funding system and reimbursements from customers may occur at different times, which means that at any given moment, the NWCF's balance could be high or low relative to the final cost of and reimbursement for any given work. Initial estimates of the total costs to buy out all four of the Navy's shipyards ranged widely, from about \$50 million to \$500 million. Since CBO's interim report in December 2005, however,

the Navy has stated that it will work closely with the Defense Finance and Accounting Service to "close out the NWCF shipyard accounting records and determine the final exit costs to transfer the shipyards from the NWCF."<sup>49</sup> The Navy's *Report on Direct Funding for Puget Sound Naval Shipyard* contained estimated buyout costs for the Norfolk and Portsmouth shipyards.

Another concern associated with mission-funded shipyards has been that delays in direct appropriations could harm the continuity of their operations between fiscal years. Such a scenario could arise in several circumstances: if the Congress failed to appropriate money at the beginning of a year (and also failed to pass a continuing resolution that continued the prior year's funding until a specified date), if a shipyard exhausted its appropriations because its expenses for work were greater than it expected, or if money that was initially appropriated for a shipyard was reprogrammed to pay for other needs. Under working-capital financing systems, funds usually carry over to the next year (subject to certain limitations).<sup>50</sup> However, the Navy claims that working-capital-funded shipyards only had enough cash to operate for a short period after their customers' appropriated dollars ran out.<sup>51</sup> Furthermore, the Navy believes that funding gaps do not present more of a problem for mission-funded shipyards than for working-capital facilities, because at mission-funded shipyards, as much as 30 percent of the workload will be financed on a reimbursable basis rather than by direct annual appropriations and neither the Pearl Harbor nor the Puget Sound shipyard has experienced a funding gap during its years of mission funding.<sup>52</sup>

A last issue is that working-capital and mission funding approaches differ in their methods for addressing shortfalls in funding. If a shipyard funded under the working-

49. Department of the Navy, *Report on Direct Funding for Puget Sound Naval Shipyard*, p. 7, which is included in Congressional Budget Office, *Review of Proposed Congressional Budget Exhibits for the Navy's Mission-Funded Shipyards*.

50. Department of Defense, Under Secretary of Defense (Comptroller), *Financial Management Regulation*, vol. 2B, Chapter 9, p. 9-32 (June 2006).

51. Department of the Navy, *Report on Direct Funding for Puget Sound Naval Shipyard*, pp. 7–8.

52. Ibid.

capital method received less work than expected (and consequently less funding), that shortfall would be reflected in future years in the form of higher labor rates. If a mission-funded shipyard experiences an unexpected drop in funding, the facility must reduce costs during the current year to keep from violating the Antideficiency

Act. In contrast, working-capital funding allowed shipyards to soften the blow of shortfalls by recouping them across multiple years. However, that seeming advantage may also have inhibited the implementation of near-term financial or operational improvements.